



#4

SEQUENCE LISTING

<110> OHTAKI, HIROMI

NAKAMURA, JUN

IZUI, HIROSHI

NAKAMATSU, TSUYOSHI

<120> BACTERIUM PRODUCING L-GLUTAMIC ACID AND METHOD FOR PRODUCING L-GLUTAMIC ACID

<130> 210213US0

<140> 09/895,382

<141> 2001-07-02

<150> JP 2000-204256

<151> 2000-07-05

<160> 34

<170> PatentIn version 3.1

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ttaaacactc aggaggatcc ttgccggcca aaatcacgga cactcgtccc accccagaat 180
cccttcacgc tggtgaagag gaaaccgcag ccggtgcccg caggattggt gccacctatt 240
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tgcgttacac caaggctcgt tctgaacacg aggaagctca gccaaagaag gctacaaagc 360
ggactcgtaa ggctaccagc taagaaggct gctgctaaga aaacgaccaa gaagaccact 420
aagaaaacta ctaaaaagac caccgcaaag aagaccacaa agaagtctta agccgatct 480

tat atg gat gat tcc aat agc ttt gta gtt gtt gct aac cgt ctg cca	528
Met Asp Asp Ser Asn Ser Phe Val Val Val Ala Asn Arg Leu Pro	
1 5 10 15	
gtg gat atg act gtc cac cca gat ggt agc tat agc atc tcc ccc agc	576
Val Asp Met Thr Val His Pro Asp Gly Ser Tyr Ser Ile Ser Pro Ser	
20 25 30	
ccc ggt ggc ctt gtc acg ggg ctt tcc ccc gtt ctg gaa caa cat cgt	624
Pro Gly Gly Leu Val Thr Gly Leu Ser Pro Val Leu Glu Gln His Arg	
35 40 45	
gga tgt tgg gtc gga tgg cct gga act gta gat gtt gca ccc gaa cca	672
Gly Cys Trp Val Gly Trp Pro Gly Thr Val Asp Val Ala Pro Glu Pro	
50 55 60	
ttt cga aca gat acg ggt gtt ttg ctg cac cct gtt gtc ctc act gca	720
Phe Arg Thr Asp Thr Gly Val Leu Leu His Pro Val Val Leu Thr Ala	
65 70 75	
agt gac tat gaa ggc ttc tac gag ggc ttt tca aac gca acg ctg tgg	768
Ser Asp Tyr Glu Gly Phe Tyr Glu Gly Phe Ser Asn Ala Thr Leu Trp	
80 85 90 95	
cct ctt ttc cac gat ctg att gtt act ccg gtg tac aac acc gat tgg	816
Pro Leu Phe His Asp Leu Ile Val Thr Pro Val Tyr Asn Thr Asp Trp	
100 105 110	
tgg cat gcg ttt cgg gaa gta aac ctc aag ttc gct gaa gcc gtg agc	864
Trp His Ala Phe Arg Glu Val Asn Leu Lys Phe Ala Glu Ala Val Ser	
115 120 125	
caa gtg gcg gca cac ggt gcc act gtg tgg gtg cag gac tat cag ctg	912
Gln Val Ala Ala His Gly Ala Thr Val Trp Val Gln Asp Tyr Gln Leu	
130 135 140	
ttg ctg gtt cct ggc att ttg cgc cag atg cgc ctt gat ttg aag atc	960
Leu Leu Val Pro Gly Ile Leu Arg Gln Met Arg Leu Asp Leu Lys Ile	
145 150 155	
ggt ttc ttc ctc cac att ccc ttc cct tcc cct gat ctg ttc cgt cag	1008
Gly Phe Phe Leu His Ile Pro Phe Pro Ser Pro Asp Leu Phe Arg Gln	
160 165 170 175	
ctg ccg tgg cgt gaa gag att gtt cga ggc atg ctg ggc gca gat ttg	1056
Leu Pro Trp Arg Glu Glu Ile Val Arg Gly Met Leu Gly Ala Asp Leu	
180 185 190	
gtg gga ttc cat ttg gtt caa aac gca gaa aac ttc ctt gcg tta acc	1104
Val Gly Phe His Leu Val Gln Asn Ala Glu Asn Phe Leu Ala Leu Thr	
195 200 205	

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gaa acc gct gac gga agg cga gtt agc gtc ggg gcg ttc ccg atc tcg Glu Thr Ala Asp Gly Arg Arg Val Ser Val Gly Ala Phe Pro Ile Ser 240 245 250 255	1248
att gat gtt gaa atg ttt ggg gag gcg tcg aaa agc gcc gtt ctt gat Ile Asp Val Glu Met Phe Gly Glu Ala Ser Lys Ser Ala Val Leu Asp 260 265 270	1296
ctt tta aaa acg ctc gac gag ccg gaa acc gta ttc ctg ggc gtt gac Leu Leu Lys Thr Leu Asp Glu Pro Glu Thr Val Phe Leu Gly Val Asp 275 280 285	1344
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gaa ctg ctg gaa tcc ggc gcg ttg gag gcc gac aaa gct gtg ttg ctg Glu Leu Leu Glu Ser Gly Ala Leu Glu Ala Asp Lys Ala Val Leu Leu 305 310 315	1440
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cgc atg ggg cgt ccc gtg gtg cat tat cta cac agg tca ttg agc aaa Arg Met Gly Arg Pro Val Val His Tyr Leu His Arg Ser Leu Ser Lys 355 360 365	1584
aat gat ctc cag gtg ctg tat acc gca gcc gat gtc atg ctg gtt acg Asn Asp Leu Gln Val Leu Tyr Thr Ala Ala Asp Val Met Leu Val Thr 370 375 380	1632
cct ttt aaa gac ggt atg aac ttg gtg gct aaa gaa ttc gtg gcc aac Pro Phe Lys Asp Gly Met Asn Leu Val Ala Lys Glu Phe Val Ala Asn 385 390 395	1680
cac cgc gac ggc act ggt gct ttg gtg ctg tcc gaa ttt gcc ggc gcg His Arg Asp Gly Thr Gly Ala Leu Val Leu Ser Glu Phe Ala Gly Ala 400 405 410 415	1728

gcc act gag ctg acc ggt gcg tat tta tgc aac cca ttt gat gtg gaa	1776
Ala Thr Glu Leu Thr Gly Ala Tyr Leu Cys Asn Pro Phe Asp Val Glu	
420 425 430	
tcc atc aaa cgg caa atg gtg gca gct gtc cat gat ttg aag cac aat	1824
Ser Ile Lys Arg Gln Met Val Ala Ala Val His Asp Leu Lys His Asn	
435 440 445	
ccg gaa tct gcg gca acg cga atg aaa acg aac agc gag cag gtc tat	1872
Pro Glu Ser Ala Ala Thr Arg Met Lys Thr Asn Ser Glu Gln Val Tyr	
450 455 460	
acc cac gac gtc aac gtg tgg gct aat agt ttc ctg gat tgt ttg gcg	1920
Thr His Asp Val Asn Val Trp Ala Asn Ser Phe Leu Asp Cys Leu Ala	
465 470 475	
cag tcg gga gaa aac tca tgaaccgcgc acgaatcgcg accataggcg	1968
Gln Ser Gly Glu Asn Ser	
480 485	
ttcttccgct tgctttactg ctggcgtcct gtggttcaga caccgtggaa atgacagatt	2028
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gacaagaact caaagttcat aacgagctgg ttgatcttct gcctgggttct tttgaaatct	2328
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25

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 35 40 45

Cys Trp Val Gly Trp Pro Gly Thr Val Asp Val Ala Pro Glu Pro Phe
 50 55 60

Arg Thr Asp Thr Gly Val Leu Leu His Pro Val Val Leu Thr Ala Ser
 65 70 75 80

Asp Tyr Glu Gly Phe Tyr Glu Gly Phe Ser Asn Ala Thr Leu Trp Pro
 85 90 95

Leu Phe His Asp Leu Ile Val Thr Pro Val Tyr Asn Thr Asp Trp Trp
 100 105 110

His Ala Phe Arg Glu Val Asn Leu Lys Phe Ala Glu Ala Val Ser Gln
 115 120 125

Val Ala Ala His Gly Ala Thr Val Trp Val Gln Asp Tyr Gln Leu Leu
 130 135 140

Leu Val Pro Gly Ile Leu Arg Gln Met Arg Leu Asp Leu Lys Ile Gly
 145 150 155 160

Phe Phe Leu His Ile Pro Phe Pro Ser Pro Asp Leu Phe Arg Gln Leu
 165 170 175

Pro Trp Arg Glu Glu Ile Val Arg Gly Met Leu Gly Ala Asp Leu Val
 180 185 190

Gly Phe His Leu Val Gln Asn Ala Glu Asn Phe Leu Ala Leu Thr Gln
 195 200 205

Gln Val Ala Gly Thr Ala Gly Ser His Val Gly Gln Pro Asp Thr Leu
 210 215 220

Gln Val Ser Gly Glu Ala Leu Val Arg Glu Ile Gly Ala His Val Glu

225	230	235	240
Thr Ala Asp Gly Arg Arg Val Ser Val Gly Ala Phe Pro Ile Ser Ile	245	250	255
Asp Val Glu Met Phe Gly Glu Ala Ser Lys Ser Ala Val Leu Asp Leu	260	265	270
Leu Lys Thr Leu Asp Glu Pro Glu Thr Val Phe Leu Gly Val Asp Arg	275	280	285
Leu Asp Tyr Thr Lys Gly Ile Leu Gln Arg Leu Leu Ala Phe Glu Glu	290	295	300
Leu Leu Glu Ser Gly Ala Leu Glu Ala Asp Lys Ala Val Leu Leu Gln	305	310	315
Val Ala Thr Pro Ser Arg Glu Arg Ile Asp His Tyr Arg Val Ser Arg	325	330	335
Ser Gln Val Glu Glu Ala Val Gly Arg Ile Asn Gly Arg Phe Gly Arg	340	345	350
Met Gly Arg Pro Val Val His Tyr Leu His Arg Ser Leu Ser Lys Asn	355	360	365
Asp Leu Gln Val Leu Tyr Thr Ala Ala Asp Val Met Leu Val Thr Pro	370	375	380
Phe Lys Asp Gly Met Asn Leu Val Ala Lys Glu Phe Val Ala Asn His	385	390	395
Arg Asp Gly Thr Gly Ala Leu Val Leu Ser Glu Phe Ala Gly Ala Ala	405	410	415
Thr Glu Leu Thr Gly Ala Tyr Leu Cys Asn Pro Phe Asp Val Glu Ser	420	425	430
Ile Lys Arg Gln Met Val Ala Ala Val His Asp Leu Lys His Asn Pro			

435

440

445

Glu Ser Ala Ala Thr Arg Met Lys Thr Asn Ser Glu Gln Val Tyr Thr
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 Met Ala Arg Pro Ile Ser Ala Thr Tyr Arg
 1 5 10

111

ctt caa atg cga gga cct caa gca gat agc gcc ggg cgt ttc ttt ggt Leu Gln Met Arg Gly Pro Gln Ala Asp Ser Ala Gly Arg Phe Phe Gly 15 20 25	159
ttt gcg cag gcc aaa gcc cag ctt ccc tat ctg aag aag cta ggc atc Phe Ala Gln Ala Lys Ala Gln Leu Pro Tyr Leu Lys Lys Leu Gly Ile 30 35 40	207
agc cac ctg tac ctc tcc cct att ttt acg gcc atg cca gat tcc aat Ser His Leu Tyr Leu Ser Pro Ile Phe Thr Ala Met Pro Asp Ser Asn 45 50 55	255
cat ggc tac gat gtc att gat ccc acc gcc atc aat gaa gag ctc ggt His Gly Tyr Asp Val Ile Asp Pro Thr Ala Ile Asn Glu Glu Leu Gly 60 65 70	303
ggc atg gag ggt ctt cga gat ctt gct gca gct aca cac gag ttg ggc Gly Met Glu Gly Leu Arg Asp Leu Ala Ala Ala Thr His Glu Leu Gly 75 80 85 90	351
atg ggc atc atc att gat att gtt ccc aac cat tta ggt gtt gcc gtt Met Gly Ile Ile Ile Asp Ile Val Pro Asn His Leu Gly Val Ala Val 95 100 105	399
cca cat ttg aat cct tgg tgg tgg gat gtt cta aaa aac ggc aaa gat Pro His Leu Asn Pro Trp Trp Trp Asp Val Leu Lys Asn Gly Lys Asp 110 115 120	447
tcc gct ttt gag ttc tat ttc gat att gac tgg cac gaa gac aac ggt Ser Ala Phe Glu Phe Tyr Phe Asp Ile Asp Trp His Glu Asp Asn Gly 125 130 135	495
tct ggt ggc aag ctg ggc atg ccg att ctg ggt gct gaa ggc gat gaa Ser Gly Gly Lys Leu Gly Met Pro Ile Leu Gly Ala Glu Gly Asp Glu 140 145 150	543
gac aag ctg gaa ttc gcg gag ctt gat gga gag aaa gtg ctc aaa tat Asp Lys Leu Glu Phe Ala Glu Leu Asp Gly Glu Lys Val Leu Lys Tyr 155 160 165 170	591
ttt gac cac ctc ttc cca atc gcg cct ggt acc gaa gaa ggg aca ccg Phe Asp His Leu Phe Pro Ile Ala Pro Gly Thr Glu Glu Gly Thr Pro 175 180 185	639
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ggc gtg atc aac ttc cgt cgc ttc ttt tcc gtg aat acg ttg gct ggc Gly Val Ile Asn Phe Arg Arg Phe Phe Ser Val Asn Thr Leu Ala Gly 205 210 215	735

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cgc gat aac ttc tcc acc gca ggc acc aac gtc acc gaa gac aaa ctt Arg Asp Asn Phe Ser Thr Ala Gly Thr Asn Val Thr Glu Asp Lys Leu 365 370 375	1215
agc gaa acc atc atc gaa tta gtc gcc gcc atg ccc gtc tac cgc gcc Ser Glu Thr Ile Ile Glu Leu Val Ala Ala Met Pro Val Tyr Arg Ala 380 385 390	1263
gac tac atc tcc ctc tca cgc acc acc gcc acc gtc atc gcg gag atg Asp Tyr Ile Ser Leu Ser Arg Thr Thr Ala Thr Val Ile Ala Glu Met 395 400 405 410	1311
tcc aaa cgc ttc ccc tcc cgg cgc gac gca ctc gac ctc atc tcg gcc Ser Lys Arg Phe Pro Ser Arg Arg Asp Ala Leu Asp Leu Ile Ser Ala 415 420 425	1359

gcc cta ctt ggc aat ggc gag gcc aaa atc cgc ttc gcc caa gtc tgc Ala Leu Leu Gly Asn Gly Glu Ala Lys Ile Arg Phe Ala Gln Val Cys 430 435 440	1407
ggc gcc gtc atg gcc aaa ggt gtg gaa gac acc acc ttc tac cgc gca Gly Ala Val Met Ala Lys Gly Val Glu Asp Thr Thr Phe Tyr Arg Ala 445 450 455	1455
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ggc gtc tcc gct gca gaa ttc cac ttg ctg cag gaa gaa cgc agc ctg Gly Val Ser Ala Ala Glu Phe His Leu Leu Gln Glu Glu Arg Ser Leu 475 480 485 490	1551
ctg tgg cca cgc acc atg acc acc ttg tcc acg cac gac acc aaa cgc Leu Trp Pro Arg Thr Met Thr Thr Leu Ser Thr His Asp Thr Lys Arg 495 500 505	1599
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gac ggc gca acg ggc agt ttc ctc cta caa aac ctg ctg ggc gta tgg Asp Gly Ala Thr Gly Ser Phe Leu Leu Gln Asn Leu Leu Gly Val Trp 540 545 550	1743
ccc gcc gac ggc gtg atc acc gat gcg ctg cgc gat cga ttc agg gaa Pro Ala Asp Gly Val Ile Thr Asp Ala Leu Arg Asp Arg Phe Arg Glu 555 560 565 570	1791
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gac ccc aac gag tcc ttc gag gct gcg gtc tgc gat tgg gtg gaa gcg Asp Pro Asn Glu Ser Phe Glu Ala Val Cys Asp Trp Val Glu Ala 590 595 600	1887
ctt ttc gac gga ccc tcc acc tca tta atc acc gaa ttt gtc tcc cac Leu Phe Asp Gly Pro Ser Thr Ser Leu Ile Thr Glu Phe Val Ser His 605 610 615	1935
atc aac cgt ggc tct gtg aat atc tcc tta ggt agg aaa ctg ctg caa Ile Asn Arg Gly Ser Val Asn Ile Ser Leu Gly Arg Lys Leu Leu Gln 620 625 630	1983

atg gtg ggc gct gga atc ccc gac act tac caa gga act gag ttt tta Met Val Gly Ala Gly Ile Pro Asp Thr Tyr Gln Gly Thr Glu Phe Leu 635 640 645 650	2031
gaa gac tcc ctg gta gat ccc gat aac cga cgc ttt gtt gat tac acc Glu Asp Ser Leu Val Asp Pro Asp Asn Arg Arg Phe Val Asp Tyr Thr 655 660 665	2079
gcc aga gaa caa gtc ctg gag cgc ctg caa acc tgg gat tgg acg cag Ala Arg Glu Gln Val Leu Glu Arg Leu Gln Thr Trp Asp Trp Thr Gln 670 675 680	2127
gtt aat tcg gta gaa gac ttg gtg gat aac gcc gac atc gcc aaa atg Val Asn Ser Val Glu Asp Leu Val Asp Asn Ala Asp Ile Ala Lys Met 685 690 695	2175
gcc gtg gtc cat aaa tcc ctc gag ttg cgt gct gaa ttt cgt gca agc Ala Val Val His Lys Ser Leu Glu Leu Arg Ala Glu Phe Arg Ala Ser 700 705 710	2223
ttt gtt ggt gga gat cat cag gca gta ttt ggc gaa ggt cgc gca gaa Phe Val Gly Gly Asp His Gln Ala Val Phe Gly Glu Gly Arg Ala Glu 715 720 725 730	2271
tcc cac atc atg ggc atc gcc cgc ggt aca gac cga aac cac ctc aac Ser His Ile Met Gly Ile Ala Arg Gly Thr Asp Arg Asn His Leu Asn 735 740 745	2319
atc att gct ctt gct acc cgt cga cca ctg atc ttg gaa gac cgt ggc Ile Ile Ala Leu Ala Thr Arg Arg Pro Leu Ile Leu Glu Asp Arg Gly 750 755 760	2367
gga tgg tat gac acc acc gtc acg ctt cct ggt gga caa tgg gaa gac Gly Trp Tyr Asp Thr Thr Val Thr Leu Pro Gly Gly Gln Trp Glu Asp 765 770 775	2415
agg ctc acc ggg caa cgc ttc agt ggt gtt gtc cca gcc acc gat ttg Arg Leu Thr Gly Gln Arg Phe Ser Gly Val Val Pro Ala Thr Asp Leu 780 785 790	2463
ttc tca cat tta ccc gta tct ttg ttg gtt tta gta ccc gat agt gag Phe Ser His Leu Pro Val Ser Leu Leu Val Leu Val Pro Asp Ser Glu 795 800 805 810	2511
ttt tgatccctgc acaggaaagt tagcggcgct actatgaacg atcgatatgt Phe	2564
ctgacaacac tctctcccaa tttggcagtt actaccacga attccgacgt gcccatccca	2624
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<212> PRT

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<400> 32

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Gln Ala Asp Ser Ala Gly Arg Phe Phe Gly Phe Ala Gln Ala Lys Ala
 20 25 30

Gln Leu Pro Tyr Leu Lys Lys Leu Gly Ile Ser His Leu Tyr Leu Ser
 35 40 45

Pro Ile Phe Thr Ala Met Pro Asp Ser Asn His Gly Tyr Asp Val Ile
 50 55 60

Asp Pro Thr Ala Ile Asn Glu Glu Leu Gly Gly Met Glu Gly Leu Arg
 65 70 75 80

Asp Leu Ala Ala Ala Thr His Glu Leu Gly Met Gly Ile Ile Ile Asp
 85 90 95

Ile Val Pro Asn His Leu Gly Val Ala Val Pro His Leu Asn Pro Trp
 100 105 110

Trp Trp Asp Val Leu Lys Asn Gly Lys Asp Ser Ala Phe Glu Phe Tyr
 115 120 125

Phe Asp Ile Asp Trp His Glu Asp Asn Gly Ser Gly Gly Lys Leu Gly
130 135 140

Met Pro Ile Leu Gly Ala Glu Gly Asp Glu Asp Lys Leu Glu Phe Ala
145 150 155 160

Glu Leu Asp Gly Glu Lys Val Leu Lys Tyr Phe Asp His Leu Phe Pro
165 170 175

Ile Ala Pro Gly Thr Glu Glu Gly Thr Pro Gln Glu Val Tyr Lys Arg
180 185 190

Gln His Tyr Arg Leu Gln Phe Trp Arg Asp Gly Val Ile Asn Phe Arg
195 200 205

Arg Phe Phe Ser Val Asn Thr Leu Ala Gly Ile Arg Gln Glu Asp Pro
210 215 220

Leu Val Phe Glu His Thr His Arg Leu Leu Arg Glu Leu Val Ala Glu
225 230 235 240

Asp Leu Ile Asp Gly Val Arg Val Asp His Pro Asp Gly Leu Ser Asp
245 250 255

Pro Phe Gly Tyr Leu His Arg Leu Arg Asp Leu Ile Gly Pro Asp Arg
260 265 270

Trp Leu Ile Ile Glu Lys Ile Leu Ser Val Asp Glu Pro Leu Asp Pro
275 280 285

Arg Leu Ala Val Asp Gly Thr Thr Gly Tyr Asp Pro Leu Arg Glu Leu
290 295 300

Asp Gly Val Phe Ile Ser Arg Glu Ser Glu Asp Lys Phe Ser Met Leu
305 310 315 320

Ala Leu Thr His Ser Gly Ser Thr Trp Asp Glu Arg Ala Leu Lys Ser
325 330 335

Thr Glu Glu Ser Leu Lys Arg Val Val Ala Gln Gln Glu Leu Ala Ala
340 345 350

Glu Ile Leu Arg Leu Ala Arg Ala Met Arg Arg Asp Asn Phe Ser Thr
355 360 365

Ala Gly Thr Asn Val Thr Glu Asp Lys Leu Ser Glu Thr Ile Ile Glu
370 375 380

Leu Val Ala Ala Met Pro Val Tyr Arg Ala Asp Tyr Ile Ser Leu Ser
385 390 395 400

Arg Thr Thr Ala Thr Val Ile Ala Glu Met Ser Lys Arg Phe Pro Ser
405 410 415

Arg Arg Asp Ala Leu Asp Leu Ile Ser Ala Ala Leu Leu Gly Asn Gly
420 425 430

Glu Ala Lys Ile Arg Phe Ala Gln Val Cys Gly Ala Val Met Ala Lys
435 440 445

Gly Val Glu Asp Thr Thr Phe Tyr Arg Ala Ser Arg Leu Val Ala Leu
450 455 460

Gln Glu Val Gly Gly Ala Pro Gly Arg Phe Gly Val Ser Ala Ala Glu
465 470 475 480

Phe His Leu Leu Gln Glu Glu Arg Ser Leu Leu Trp Pro Arg Thr Met
485 490 495

Thr Thr Leu Ser Thr His Asp Thr Lys Arg Gly Glu Asp Thr Arg Ala
500 505 510

Arg Ile Ile Ser Leu Ser Glu Val Pro Asp Met Tyr Ser Glu Leu Val
515 520 525

Asn Arg Val Phe Ala Val Leu Pro Ala Pro Asp Gly Ala Thr Gly Ser
530 535 540

Phe Leu Leu Gln Asn Leu Leu Gly Val Trp Pro Ala Asp Gly Val Ile
545 550 555 560

Thr Asp Ala Leu Arg Asp Arg Phe Arg Glu Tyr Ala Leu Lys Ala Ile
565 570 575

Arg Glu Ala Ser Thr Lys Thr Thr Trp Val Asp Pro Asn Glu Ser Phe
580 585 590

Glu Ala Ala Val Cys Asp Trp Val Glu Ala Leu Phe Asp Gly Pro Ser
595 600 605

Thr Ser Leu Ile Thr Glu Phe Val Ser His Ile Asn Arg Gly Ser Val
610 615 620

Asn Ile Ser Leu Gly Arg Lys Leu Leu Gln Met Val Gly Ala Gly Ile
625 630 635 640

Pro Asp Thr Tyr Gln Gly Thr Glu Phe Leu Glu Asp Ser Leu Val Asp
645 650 655

Pro Asp Asn Arg Arg Phe Val Asp Tyr Thr Ala Arg Glu Gln Val Leu
660 665 670

Glu Arg Leu Gln Thr Trp Asp Trp Thr Gln Val Asn Ser Val Glu Asp
675 680 685

Leu Val Asp Asn Ala Asp Ile Ala Lys Met Ala Val Val His Lys Ser
690 695 700

Leu Glu Leu Arg Ala Glu Phe Arg Ala Ser Phe Val Gly Gly Asp His
705 710 715 720

Gln Ala Val Phe Gly Glu Gly Arg Ala Glu Ser His Ile Met Gly Ile
725 730 735

Ala Arg Gly Thr Asp Arg Asn His Leu Asn Ile Ile Ala Leu Ala Thr
740 745 750

Arg Arg Pro Leu Ile Leu Glu Asp Arg Gly Gly Trp Tyr Asp Thr Thr
755 760 765

Val Thr Leu Pro Gly Gly Gln Trp Glu Asp Arg Leu Thr Gly Gln Arg
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Phe Ser Gly Val Val Pro Ala Thr Asp Leu Phe Ser His Leu Pro Val
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